

NASA TECH BRIEF



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Improved Carbon Electrode Reduces Arc Sputtering

The problem: To decrease the ejection of incandescent particles from carbon electrodes. Arc sputtering, due to the ejection of these particles, causes pitting and opaquing of optical elements.

The solution: Use carbon rod cores with a smaller proportion of rare earth compounds than in cores of standard composition.

How it's done: The composition of the new core before the addition of binder is as follows:

Material	Percent by Weight
Rare Earth Fluoride (REF)	12
Rare Earth Oxide (REO)	23
Graphite, Natural Flake	52
Strontium Fluoride	10
Sulfur	3

The binder, a coal tar pitch, is added in a weight ratio of 17 parts of binder to 100 parts of the blended chemicals.

A test comparison of the relative merits of 16-mm standard cores and new cores is given below. All tests were made at an arc current of 400 amperes. The energy distribution of the new arc remained unchanged.

	Standard Core	New Core
Weight Ratio REF:REO	1:1	1:2
Graphite: (REF + REO)	1:1	1.5:1
Arc Sputtering Rate (Mg/Min)	0.26*	0.017*
Light Output Relative Center		
Brightness	100	95.5
Carbon Consumption (In./Hr)	58.2	50.9
Arc Power (KW)	31.2	29.6

*Ejected incandescent particles consist mainly of rare earth compounds.

Notes:

1. Production of the new cores does not involve any additional equipment or cost.
2. These cores should be valuable in high-power searchlights, theater projectors, and in equipment used for accelerated ultraviolet exposure tests in the paper, paint, textiles, and plastics industries.
3. Related innovations are described in NASA Tech Briefs B65-10018, January 1965; B65-10095, April 1965; and B65-10108, April 1965. Inquiries may also be directed to:

Technology Utilization Officer
Manned Spacecraft Center
P.O. Box 1547
Houston, Texas, 77001
Reference: B66-10026

Patent status: NASA encourages the immediate commercial use of this invention. Inquiries about obtaining rights for its commercial use may be made to NASA, Code AGP, Washington, D.C., 20546.

Source: Union Carbide Corporation
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Category 01